

Sources and Transport of Nutrients in Coastal Plain Watersheds and the Effects of These Nutrients on Estuarine Ecosystems

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The United States coastal plain, which comprises only 10% of the nation's land area, contains over 50% of the country's population and is expected to grow by another 27 million people by the year 2015. The attendant goods and services needed to support this population growth have resulted in widespread conversion of coastal plain forests and wetlands to agriculture and, increasingly, to urban/suburban land uses. This land use conversion increases the inputs of nutrients and sediments to coastal plain rivers and hence enhances the loading of these constituents to estuaries. The result of the increased nutrient and sediment loading is estuarine habitat and water quality degradation. Some common examples are the loss of submerged aquatic vegetation, which results in removal of critical habitat for marine life, and low oxygen conditions, also known as hypoxia, which occurs widely and includes well known cases such as on the Louisiana Continental Shelf and in Chesapeake Bay.

This collaborative research effort assessed how changing coastal plain watershed land uses influence the delivery of nutrients and sediments to estuaries and subsequently how estuaries respond to increasing loads of pollutants. The work was undertaken in the sub-estuaries of Mobile Bay and involved personnel and support from the U.S. Environmental Protection Agency's (U.S. EPA) Gulf Ecology Division, the Dauphin Island Sea Lab, the University of Alabama, the Alabama Center for Estuarine Studies, the National Aeronautics and Space Administration's (NASA) Alabama Space Grant Consortium, and the National Oceanic and Atmospheric Administration's (NOAA) National Estuarine Research Reserves program. The research involved characterizing nutrient and sediment loading in 18 watersheds as a function of watershed attributes. A gradient of watersheds from nearly pristine to highly urbanized and agricultural were studied in order to assess how changing land use influences the delivery of nutrients to estuaries. The estuaries receiving these nutrient loads were characterized in terms of their water quality and ecosystem emergent properties to assess how nutrients impacted water quality indicators, such as phytoplankton biomass and dissolved oxygen.

This work directly supports the U.S. EPA/ORD's Water Quality Research Program Multi-Year Plan (2003) Long-Term Goal 1, which is to "Provide the approaches and methods to develop and apply criteria for habitat alteration, nutrients, suspended and bedded sediments, pathogens, and

toxic chemicals that will support designated uses for aquatic systems.” At the local level, data collected during this research program is being utilized by the Mobile Bay National Estuary Program and the Alabama Department of Environmental Management to develop estuarine water quality criteria.

This abstract does not necessarily reflect U.S. EPA policy.